EPD

Environmental Product Declaration for Calcareous Limestone Aggregates

Elmeni (Latomia) Limited

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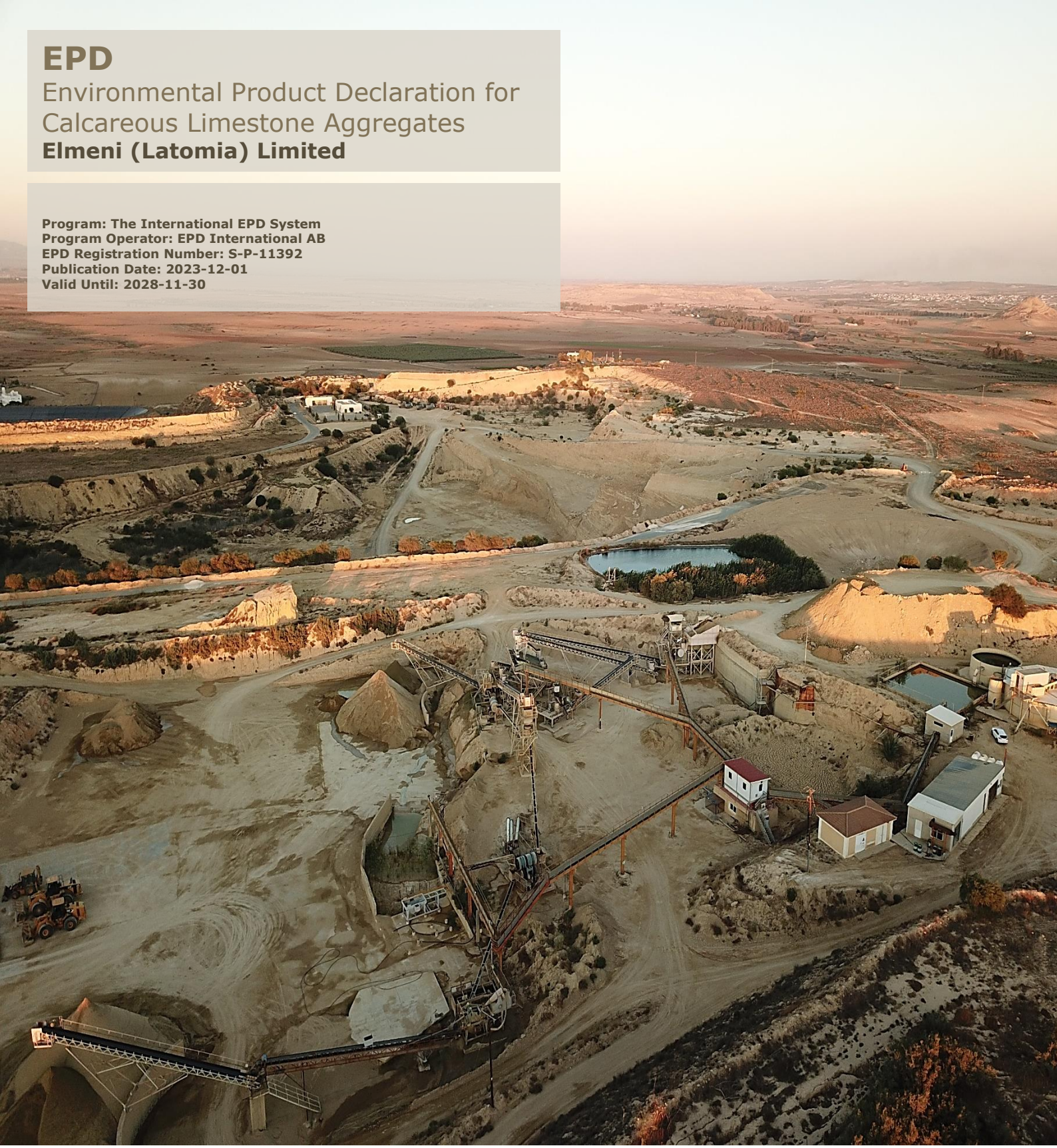

ΕΛΜΕΝΙ (ΛΑΤΟΜΕΙΑ) ΑΤΔ

LATOURIS INVESTMENTS LTD

EPD® THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

In accordance with
ISO 14025 and
EN 15804:2012+A2:2019/AC:2021
EPD of multiple products, based on the average results of the product group

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.

COMPANY INFORMATION

Elmeni (Latomia) Limited (Elmeni Quarries), started quarrying operations at Agios Sozomenos of Nicosia district (Cyprus) in 1996. Elmeni Quarries is part of a large group of quarries in Cyprus, **M.S.C. Latouros Investments Limited**.

The company excavates and processes calcareous limestone, which is suitable for producing high-quality sand. The company produces high-quality sand for concrete (CYS EN 12620), sand for mortar (CYS EN 13139) and for asphalt (CYS EN 13043).

M.S.C. Latouros Investments Limited

Building on 40 years of experience in the quarrying industry and being driven by its commitment to quality, responsible extraction and sustainable development, **M.S.C. Latouros Investments Limited (M.S.C.)** has become a leading aggregates supplier in Cyprus through a network of 3 aggregates quarries (2 calcareous limestone quarries: Latomia Latouros Limited and Elmeni (Latomia) Limited and one diabase quarry: Latomio Pyrgon Limited). M.S.C. also operates 1 gypsum quarry (Latouros Gypsum Limited), which exports high purity gypsum to Israel and Lebanon. In 2019, M.S.C. expanded its activities to also include the recycling of construction and demolition waste, located at the pit of Latouros Quarries.

The group's mission is to create value by transforming raw materials into products that can be used to provide sufficient and reliable infrastructure that makes people's lives easier and more comfortable.

M.S.C. has a holistic sustainability framework, focused equally on all 3 pillars of sustainability: society, environment and economy. Special attention is given to aspects concerning quality, environmental protection and health & safety. Thus, all M.S.C. quarries have developed and maintained Quality Management System, Environmental Management System and Health & Safety Management System conforming to the requirements of ISO 9001, ISO 14001 and ISO 45001, respectively. The Management Systems are certified by Accredited Certification Bodies.

M.S.C. continuously works on reducing its and its customers' environmental impact by offering resource and energy-efficient products that help its customers reduce their environmental impact and operate more sustainably. Thus, being aware of the growing need for enhanced transparency of the environmental performance of building materials, M.S.C. has decided to create EPDs for its products in an attempt to communicate to its customers the performance of Latouros Group's aggregates. These EPDs will drive environmental improvement throughout all M.S.C. activities and offer a competitive advantage to customers who want to be leaders in the sustainable infrastructure and building industry.

SCOPE

The scope of this product average EPD includes the calcareous limestone aggregates produced at Elmeni Quarries plant. The analysis includes **2022** full year information regarding the consumption of raw materials, electricity, water and fuels.

This EPD covers multiple aggregate types based on the declared technical standards as described in the Declaration of Performance. The aggregates included in this EPD are shown in the table below and categorized by size and usage.

PRODUCT DESCRIPTION

Calcareous limestone aggregates are produced from a naturally occurring sedimentary rock body quarry, sourced by means of crushing and screening into the required sizes.

The aggregates covered in this EPD are materials produced by Elmeni Quarries and, more specifically, in Agios Sozomenos (Nicosia district) in Cyprus.

Table 1. Product types at the declared site

No.	Product Name	Characterization	EN 12620[a]	EN 13043[b]	EN 13139[c]	EN 13242[d]
1	All-in aggregate 0/16mm	All-in aggregate				√
2	Crushed Calcareous Limestone Sand 0/4 (washed)	Fine aggregate	√			
3	Crushed Calcareous Limestone Sand 0/4 (washed)	Fine aggregate			√	
4	Crushed Calcareous Limestone Sand 0/2mm	Fine aggregate		√		
5	Mixed Crushed Calcareous Limestone Sand with Crushed Diabase Sand 0/4 (washed)	Fine aggregate			√	

[a]- *CYS EN 12620:2020+A1:2008 Aggregates for concrete*
[b]- *CYS EN 13043:2002+AC:2004 Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas*
[c]- *CYS EN 13139:2002+AC:2004 Aggregates for Mortar*
[d]- *CYS EN 13242:2002+A1:2007 Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction*

The products do not contain any substances listed in the "Candidate List of Substances of Very High Concern (SVCH) for authorization" exceeding 0.1% of the weight of the product.

Figure 1. Excavation of raw material

LCA INFORMATION

Declared unit
The declared unit is 1 tn of calcareous limestone aggregates.

Goal and Scope
This EPD evaluates the environmental impacts of producing 1 tn of calcareous limestone aggregates manufactured at the Elmeni Quarries' crushing plant.

Background data
The most recent version of the Ecoinvent database (v.3.9.1) was used as a source of background data.

Software
The software used for the production of the LCA results is OpenLCA 2.0.0.

Data quality
ISO 14044 was applied in terms of data collection and quality requirements. Data on raw materials, transportation of materials and products along with energy, fuels and water consumption in manufacturing stage was collected by Elmeni Quarries, while the impacts of the raw materials (e.g. oils, lubricants, filters and diesel) were recovered from Ecoinvent database (v.3.9.1). Regarding electricity mix, the latest (2022) version of Association of Issuing Bodies (AIB) Report for "Residual Energy Mix 2022" for Cyprus was utilized.

The climate impact (GWP-GHG) of used electricity in the A3 module is 607,40 g CO_2/kWh. The emission factor and Net Calorific Value (NCV) for diesel are provided from the National Inventory Report 2022 for Cyprus.

Time representativeness
Data refers to the whole year 2022.

Geographical scope
Worldwide

Assumptions
Module A2:
Transport is relevant for the delivery of raw materials from the supplier to the gate of the manufacturing plant. Due to the fact that the suppliers of lubricants, oils and filters are near the manufacturing plant, and quantities are minor compared to the mass of the limestone, their transportation is excluded from the study, although their environmental impacts concerning their production are taken into account.

Module A3:
Emission factors and net calorific values of diesel used and combusted in loading and crushing were obtained from the National Inventory Report (NIR) of 2022 for Cyprus. More specifically:

- Diesel Net Calorific Value (NCV): 43 TJ/kt
- Diesel Emission Factor: 74,1 t CO_2/TJ

Cut-off rules
Where there is insufficient data or data gaps for a unit process, the cut-off criteria are 1% of the total mass of input of that process. The total of neglected input flows per module is a maximum of 5% of energy usage and mass.

Allocations
Wherever possible, allocation was avoided by dividing the unit process to be allocated into two or more sub-processes and collecting the input and output data related to these sub-processes. Where allocation cannot be avoided, the inputs and outputs of the system are partitioned between its different products or functions in a way that reflects the underlying physical or economic relationships between them. In this case, no allocation was made since all activity data provided relate to all products manufactured in Elmeni Quarries plant as an average product.

SYSTEM BOUNDARY
The scope of the study is set to be Cradle-to-gate. The system's boundaries are shown in more detail in the table below. It should be noted that construction stage (modules A4-A5) and use stage (modules B1-B7) are optional and are not under the scope of this study. End of life stages (modules C1-C4) and the resource recovery stage (module D) are obligatory but can be excluded if the following three conditions are valid:
• the product or material is physically integrated with other products during installation so they cannot be physically separated from them at the end of life,
• the product or material is no longer identifiable at the end of life as a result of a physical or chemical transformation process, and
• the product or material does not contain biogenic carbon.
All these three criteria are met. Thus, the scope of the study is cradle-to-gate (modules A1-A3).

Table 2. System boundaries

	Product stage			***Construction stage***		***Use stage***							***End of life stage***				***Resource recovery stage***
	Raw Materials Supply	**Transport**	**Manufacturing**	**Transport**	**Construction installation**	**Use**	**Maintenance**	**Repair**	**Replacement**	**Refurbishment**	**Operational energy use**	**Operational water use**	**De-construction and demolition**	**Transport**	**Waste processing for reuse, recovery and/or recycling**	**Disposal**	**Reuse-Recovery-Recycling-potential**
Modules	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	CY	CY	CY	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products		<10%		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-sites		0%		-	-	-	-	-	-	-	-	-	-	-	-	-	-

X= Included, ND= Module Not Declared

Figure 2. A summary of the excavation and production process

A1-A3: Product Stage

A1: Raw Material Supply

Production starts with raw materials supply. The main raw materials used for the production of calcareous limestone aggregates are energy carriers (diesel and electricity). Furthermore, small quantities of oils, lubricants and filters are utilized for equipment operation during the manufacturing process.

A2: Transportation of raw materials to manufacturer

Transport is relevant for delivery of raw materials from the supplier to the gate of manufacturing plant. Due to the fact that the suppliers of lubricants, oils and filters are nearby the manufacturing plant, and quantities are minor compared to the mass of the calcareous limestone produced, their transportation is excluded from the study, although their environmental impacts concerning their production are taken into account.

A3: Manufacturing

The extraction of the calcareous limestone is always achieved with mechanical means. More precisely, the raw material is extracted with the use of a bulldozer. The raw material is loaded with a wheel loader onto 2 trucks and then transported to the crushing plant and follows the stages below:

- **Primary Crushing:** raw material is crushed by the jaw crusher and transferred through conveyor belts to the screens.
- **Secondary Crushing:** crushed material from the primary crushing is transferred from the screens to the second crusher, the VSI mag-impact crusher.
- **Screening:** material of both the primary and the secondary crushing is being sieved to the screens.
- **Tertiary Crushing:** the material that passes through the screens is transferred by conveyor belts to rod mills (two-rod mills) and a third crushing is taking place.
- **Washing:** after the tertiary crushing, the material has to be washed in the hydroclones (two hydroclones), resulting in the final product.
- The aggregates are available in the form of bulk products, and no packaging is used.

The washing of the sand results in liquid sludge, which is processed to remove the "clear water" from the sludge. The water is reused in the washing stage, and the liquid sludge is pumped to the old quarry pit for rehabilitation.

The total quantity of diesel fuel includes, among others transportation related to the manufacturing process, and the consumption of fuel related to the transportation of the extracted material from the quarry to the manufacturing plant.

Waste disposal concerning sludge and gravel is excluded from the study since the total quantity of waste generated from the manufacturing process is used for quarry restoration treatment.

Figure 3. Aerial photo of Elmeni crushing plant

ENVIRONMENTAL PERFORMANCE INDICATORS

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Table 3. Environmental Indicators - Total A1-A3

ENVIRONMENTAL IMPACTS	***Unit***	***A1-A3 Calcareous limestone aggregates***
GWP-total	kg CO_2 eq	6,23E+00
GWP-fossil	kg CO_2 eq	6,22E+00
GWP-biogenic	kg CO_2 eq	6,67E-03
GWP-luluc	kg CO_2 eq	3,03E-03
GWP-GHG	kg CO_2 eq	6,20E+00
ODP	kg CFC^{-11} eq	1,18E-07
AP	mol H^+ eq	2,20E-02
EP-freshwater	kg P eq	1,07E-03
EP-marine	kg N eq	3,59E-03
EP-terrestrial	mol N eq	3,52E-02
POCP	kg NMVOC eq	1,72E-02
ADPe	kg Sb eq	4,75E-06
ADPf	MJ	9,02E+01
WDP	m^3 eq	3,54E+01

[1] This indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide emissions and uptake and biogenic carbon stored in the product with characterization factors (CFs) based on IPCC (2013).
[2] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Table 4. Resource Use - Total A1-A3

RESOURCE USE	***Unit***	***A1-A3 Calcareous limestone aggregates***
PERE	MJ	5,05E+00
PERM	MJ	0,00E+00
PERT	MJ	5,05E+00
PENRE	MJ	8,93E+01
PENRM	MJ	0,00E+00
PENRT	MJ	8,93E+01
SM	kg	0,00E+00
RSF	MJ	0,00E+00
NRSF	MJ	0,00E+00
FW	m^3	8,25E-01

***PERE**: Use of renewable primary energy excluding renewable primary energy resources used as raw materials, **PERM**: Use of renewable primary energy resources used as raw materials, **PERT**: Total use of renewable primary energy resources, **PENRE**: Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials, **PENRM**: Use of non-renewable primary energy resources used as raw materials, **PENRT**: Total use of non-renewable primary energy resources, **SM**: Use of secondary materials, **RSF**: Use of renewable secondary materials, **NRSF**: Use of non-renewable secondary fuels, **FW**: Use of net fresh water*

Table 5. Output Flows and Waste Categories - Total A1-A3

OUTPUT FLOWS AND WASTE CATEGORIES	***Unit***	***A1-A3 Calcareous limestone aggregates***
HWD	kg	4,33E-04
NHWD	kg	1,57E-01
RWD	kg	1,81E-04
CRU	kg	0,00E+00
MFR	kg	0,00E+00
MER	kg	0,00E+00
EE	MJ	0,00E+00

***HWD**: Hazardous waste disposed, **NHWD**: Non-hazardous waste disposed, **RWD**: Radioactive waste disposed, **CRU**: Components for re-use, **MFR**: Materials for recycling, **MER**: Materials for energy recovery, **EE**: Exported energy*

Figure 4. Rehabilitation of the old quarry pit

ADDITIONAL INFORMATION

- The EPD does not give information on the release of dangerous substances to soil, water and indoor air because the horizontal standards on measurement of the release of regulated dangerous substances from construction products using harmonized test methods, according to the provisions of the respective technical committees for European product standards, are not available.
- The EPD owner has the sole ownership, liability, and responsibility of the EPD.
- EPDs within the same product category but registered in different EPD programmes may not be comparable.
- For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterization factors); have equivalent content declarations; and be valid at the time of comparison.

REFERENCES

- **General Programme Instructions of the International EPD® System**. Version 4.0, 2021-03-29
- **PCR 2019:14 v.1.3.1** Construction products. EPD System. Date 2023-07-08. Valid until 2024-12-20
- **EN 15804:2012+A2:2019/AC:2021**, Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products
- **ISO 14020:2000** Environmental labels and declarations — General principles
- **ISO 14025:2006** Environmental labels and declarations - Type III environmental declarations — Principles and procedures
- **ISO 14040:2006** Environmental management - Life cycle assessment-Principles and framework
- **ISO 14044:2006** Environmental management - Life cycle assessment - Requirements and guidelines
- **UEPG** (European Aggregates Association) https://uepg.eu/
- **Ecoinvent** / Ecoinvent Centre, www.Eco-invent.org
- **Residual Mixes and European Attribute Mix of 2022** from Association of Issuing Bodies (AIB)
- **United Nations Statistics Division (2015).** Central Product Classification, version 2.1, https://unstats.un.org/unsd/classifications/unsdclassifications/cpcv21.pdf
- **a- CYS EN 12620:2002+A1:2008** Aggregates for concrete
- **b- CYS EN 13043:2002+AC:2004** Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas
- **c- CYS EN 13139:2002+AC:2004** Aggregates for Mortar
- **d- CYS EN 13242:2002+A1:2007** Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction

PROGRAM AND RELATED INFORMATION

Program:	The International EPD System
Address:	Box 210 60 SE-100 31 Stockholm, Sweden
Website:	www.environdec.com
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Accountabilities for PCR, LCA and third-party verification

Product Category Rules (PCR)

ISO standard ISO 21930:2017 and CEN standard EN 15804+A2:2019 serve as the core Product Category Rules (PCR)

PCR 2019:14 v.1.3.1 Construction products. EPD System. Date 2023-07-08. Valid until 2024-12-20

Product group classification: CPC 15320 'Pebbles, gravel, broken or crushed stone, macadam; granules, chippings and powder of stone'.

PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact

Life Cycle Assessment (LCA)

LCA Accountability: ENVIROMETRICS S.A.

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Owner of the EPD

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Third party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

LCA.cz

Prof. Vladimír Kočí, Šárecká 5,16000, Prague 6 - Czech Republic
http://www.lca.cz/

Procedure for follow-up during EPD validity involves third party verifier
☐Yes ☒No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.

EPDs of construction products may not be comparable if they do not comply with EN 15804:2012+A2:2019. For further information about comparability, see EN 15804 and ISO 14025.